

AQP4 Protein Production May Be Pathologically Inhibited by Oral-Route Ingestion of Tremolite Asbestos $\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$, Leading to Many Cases of Neuromyelitis Optica (Often Misdiagnosed as AMD) as Well as Many Idiopathic Cases of Bipolar Disorder; Asbestos Contamination of Water More Serious Problem than Previously Thought

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Introduction

While the dangers of having asbestos in living spaces and of working with asbestos during the manufacturing and/or removal process have been closely scrutinized, the scope of the hazard may have been downplayed and in some cases, improper disposal of asbestos may have created additional unforeseen problems.

Abstract

Asbestos is not currently amongst the substances tested for in water safety tests in large part due to an assumption that asbestos can only be harmful if inhaled. Ingestion is wrongly thought to be unlikely due to an assumption that fibrous material cannot migrate into water tables.

Asbestos may have found its way into many water tables since the 1972 moratorium on asbestos installation. As with many historic contamination scandals, the abolition of the use of a substance naturally leads to a rash of hurried and improper disposals of that substance. In the case of asbestos, the moratorium that took effect in 1972 (in the U.S.) forbade installation of new asbestos, leading to the closure of essentially all factories manufacturing the substance in its consumer form that couldn't make the transition to fiber-glass insulation manufacturing.

While the legislation required safe disposal of removed insulation, given that the water table issue was not even being talked about at the time, the only real restriction was that the insulation be bagged before heading to landfills. Despite the law, with no market in which to sell its inventories, many U.S. asbestos factories simply piled their inventory on the ground outside of their factories (as old satellite photos of a now-demolished Ambler, Pennsylvania factory suggest,) where rain was able to wash fiber fragments into the ground for decades, ultimately resulting in their introduction to the water supply. With or without bagging and whether ultimate disposal occurred at a landfill or the grounds of abandoned factories, the rain would have washed fragments of asbestos into water tables. Even "proper" disposal, I submit, has caused widespread contamination.

If we look for correlations between asbestos factory sites and occurrences of both Neuromyelitis Optica (NMO) and mood disorders in the period from about 15 years after the closure of these factories to today, we may find that old "asbestos towns" have become hotbeds for a range of disorders that may be linked to a deficit of the Aquaporin-4 protein.

AQP-4 protein regulates the homeostasis of water, primarily in nerves of the spine, the optic nerves and in brain tissue. Too much or too little AQP-4 can have a deleterious effect on human neurology.

When ingested, asbestos, although it cannot cross the blood-brain barrier, may move freely throughout the rest of the body and may tend to accumulate in the kidneys, which are sensitive to hydration. At the first signs of dehydration, the kidneys signal to the rest of the body to be stingier with their usage of water by producing less AQP-4 protein. Although asbestos cannot be eliminated by the body, its acidity causes it to accumulate in the kidneys.

The kidneys' mechanism for metering hydration levels is disrupted by the presence of the acidic mineral, causing the kidneys to produce less AQP-4 as if in a state of dehydration.

AQP-4 routinely crosses the blood-brain barrier and is needed in the brain as well as nerves to regulate fluid exchange. A deficit of AQP-4 protein causes hydration levels in specific tissues to remain low regardless of the availability of water throughout the body. In severe cases, acidosis may set in, leading to conditions such as NMO. Interestingly, NMO overwhelmingly affects black and Asian patients more than Caucasian and women more often than men. If dehydration is a factor in this condition, cultural attitudes about the consumption of water may play a role in determining risk.

As for the role of asbestos in provoking mood disorders such as Bipolar Disorder, this hypothesis would seem quite plausible as studies have demonstrated in postmortem analysis of the brain tissue of BPD patients that free-floating lithium levels have been found to be deficient only because lithium may be sequestered in clumps in certain areas, rendering it effectively inert. Even this much is a relatively recent insight into the disorder.

If a deficit of AQP-4 is leading to localized dehydration of sections of brain tissue even when overall hydration is adequate, this inappropriate dehydration may explain the consolidation of lithium into clumps. This would, if true, mean that restoring the kidneys' ability to produce sufficient AQP-4 may effectively mean curing Bipolar Disorder in a manner that restores rather than impairing neurological function, obviating the need for powerful drugs.

Conclusion

Bipolar Disorder, which was quite rare prior to the advent of asbestos use, has only become more common since 1972 perhaps because the mineral has had time to work its way into the water supply. Only through the deliberate filtration of asbestos from contaminated wells can the rate of occurrence of Bipolar Disorder as well as NMO be mitigated.